Review 3 STT 215

Chapter 7

Definitions/Rules:

*A **confidence interval (or interval estimate)** is a range (or an interval) of values used to estimate the true value of a population parameter.*

*A **point estimate** is a single value (or point) used to approximate a population parameter.*

***A confidence level** is the probability 1 – α (often expressed as the equivalent percentage value) that the confidence interval actually does contain the population parameter, assuming that the estimation process is repeated a large number of times.*

***A critical value, $z_{\alpha/2}$,** is the number on the borderline separating sample statistics that are likely to occur from those that are unlikely to occur.*

$$E = z_{\alpha/2}\sqrt{\frac{\hat{p}\hat{q}}{n}}$$

p* = population proportion** $\hat{p}$ **= sample proportion** ***$z_{\alpha/2}$ =critical value

***n* = number of sample values** ***E* = margin of error** $\hat{q} = 1 - \hat{p}$

Confidence Interval for Estimating a Population Proportion *p*

$$\hat{p} - E < p < \hat{p} + E$$

Determining Sample Size When an estimate of $\hat{p}$ is known

$$n = \frac{(Z_{\alpha/2})^2\hat{p}\hat{q}}{E^2}$$

Determining Sample Size When no estimate of $\hat{p}$ is known

$$n = \frac{(Z_{\alpha/2})^2 0.25}{E^2}$$

Confidence Interval for Estimating a Population Mean (with σ Known**)**

$$\overline{x} - E < \mu < \overline{x} + E \qquad E = z_{\alpha/2}\frac{\sigma}{\sqrt{n}}$$

Finding a Sample Size for Estimating a Population Mean

$$n = \frac{(Z_{\alpha/2})^2\sigma^2}{E^2}$$

Estimating a Population Mean: σ Not Known -*t* distribution

$$t = \frac{\overline{x} - \mu}{\frac{s}{\sqrt{n}}} \qquad E = t_{\alpha/2}\frac{s}{\sqrt{n}} \qquad \overline{x} - E < \mu < \overline{x} + E$$

df=**degrees of freedom = *n* – 1**

Sample Problems 7.2 *example 3, example 4, 21,25,* ***7.3****-example 2, 23,25,* ***7.4****-example 3,19,*

Chapter 8

Definitions:

The null hypothesis(denoted by H_0) *is a statement that the value of a population parameter is equal to some claimed value. We test the null hypothesis directly. Either reject H_0 or fail to reject H_0*

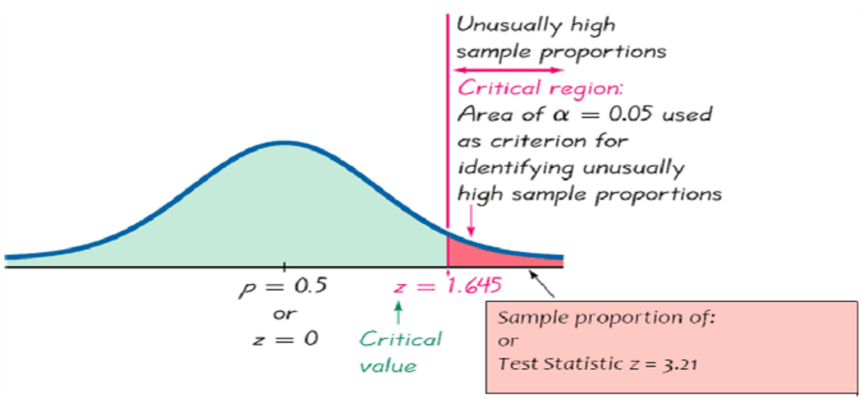
The alternative hypothesis(denoted by H_1) *is the statement that the parameter has a value that somehow differs from the null hypothesis. The symbolic form of the alternative hypothesis must use one of these symbols:* $\neq, <, >$.

P-value =*probability of getting a test statistic at least as extreme as the one representing sample data*

P-value method:*Using the significance level α:*

If P-value $\leq \alpha$, reject H_0.

If P-value > α, fail to reject H_0.



The critical region (or rejection region) *is the set of all values of the test statistic that cause us to reject the null hypothesis. For example, see the red-shaded region above.* ***Traditional Method***

If the test statistic falls within the critical region, reject H_0.

If the test statistic does not fall within the critical region, fail to reject H_0.

Test statistics-

$$t = \frac{\overline{x} - \mu}{\frac{s}{\sqrt{n}}} \quad z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}} \quad z = \frac{x - \mu}{\frac{\sigma}{\sqrt{n}}}$$

Sample Problems 8.2 *example 2, example 7-8, 31,* ***8.3****-example 6,9,19,* ***8.4****-example 1,8,17* ***8.5****-example 3 ,23*

Useful excel command

=NORMDIST(1.2,0,1,1)
=NORMINV(0.9,0,1)
=TDIST(2.2,38,1)
=TINV(0.9,30)

The Central Limit Theorem *tells us that for a population with any distribution, the distribution of the sample means approaches a normal distribution as the sample size increases.*

$$\mu_{\overline{x}} = \mu \quad \sigma_{\overline{x}} = \frac{\sigma}{\sqrt{n}}$$

For samples of size n larger than 30, the distribution of the sample means can be approximated reasonably well by a normal distribution. The approximation gets closer to a normal distribution as the sample size n becomes larger.

If the original population is normally distributed, then for any sample size n, the sample means will be normally distributed (not just the values of n larger than 30).